

# Claims

- [c1] A vision-based object detection system for a vehicle comprising:
- a plurality of vision sensing systems having at least one vision receiver and generating an object detection signal;
  - and
  - a controller comprising a plurality of sensing system aid modules corresponding to each of said plurality of vision sensing systems, operating at least one of said plurality of sensing system aid modules in response to at least one vehicle parameter, and generating at least one safety system signal in response to said object detection signal;
- said plurality of sensing system aid modules have at least one associated operating mode and operates at least one of said plurality of vision sensing systems in said at least one operating mode in response to said at least one vehicle parameter.
- [c2] A system as in claim 1 wherein said plurality of vision sensing systems are selected from at least one of a frontal and rear collision vision sensing system, a rearward collision vision sensing system, and a side collision vision sensing system.

- [c3] A system as in claim 1 wherein said controller operates said plurality of vision sensing systems in at least one mode selected from a reversing-aid mode, a parking-aid mode, a pre-collision sensing mode, an adaptive cruise control mode, a lane departure aid mode, and a lane-keeping aid mode.
- [c4] A system as in claim 1 wherein said plurality of sensing system aid modules comprises a plurality of collision avoidance and countermeasure modules.
- [c5] A system as in claim 4 wherein said plurality of collision avoidance and countermeasure modules comprises at least one module selected from a pre-collision sensing module, an adaptive cruise control module, a lane departure aid module and a lane-keeping aid module.
- [c6] A system as in claim 1 wherein said plurality of sensing system aid modules comprise a plurality of comfort and convenience modules.
- [c7] A system as in claim 6 wherein said plurality of comfort and convenience modules comprises at least one module selected from a reversing-aid module and a parking-aid module.
- [c8] A system as in claim 1 further comprising a transmission

gear sensor generating a transmission gear signal, wherein said controller operates said plurality of sensing system aid modules in response to said transmission gear signal.

- [c9] A system as in claim 1 wherein said plurality of sensing systems comprise a side collision sensing system and said controller continuously operates said side collision sensing system in a pre-collision sensing mode.
- [c10] A system as in claim 1 wherein said plurality of vision sensing systems comprises at least one frontal collision sensing system and said controller operating said at least one frontal collision sensing system in at least one mode selected from a parking-aid mode, a pre-collision sensing mode, an adaptive cruise control mode, a lane departure aid mode, and a lane-keeping aid mode.
- [c11] A system as in claim 1 wherein said plurality of vision sensing systems comprises at least one rearward collision sensing system and said controller operating said at least one rearward collision sensing system in at least one mode selected from a parking-aid mode, a reversing-aid mode, and a pre-collision sensing mode.
- [c12] A system as in claim 1 wherein said controller is a single vision processor.

- [c13] A system as in claim 1 further comprising an indicator electrically coupled to said controller and wherein said controller indicates said safety system signal via said indicator.
- [c14] A method of performing a plurality of sensing system aids for a vehicle comprising:  
generating an object detection signal via a plurality of vision sensing systems;  
operating a plurality of sensing system aid modules corresponding with each of said plurality of vision sensing systems via a single controller; and  
generating at least one safety system signal in response to said object detection signal.
- [c15] A method as in claim 14 further comprising:  
generating a transmission gear signal; and  
operating said plurality of sensing system aid modules in response to said transmission gear signal.
- [c16] A method as in claim 14 further comprising continuously operating a side collision vision sensing system in a pre-collision sensing mode.
- [c17] A method as in claim 14 further comprising operating at least one frontal collision sensing system in at least one mode selected from a parking-aid mode, a pre-collision

sensing mode, an adaptive cruise control mode, a lane departure aid mode, and a lane-keeping aid mode.

[c18] A method as in claim 14 further comprising operating at least one rearward collision sensing system in at least one mode selected from a parking-aid mode, a reversing-aid mode, and a pre-collision sensing mode.

[c19] A method as in claim 14 further comprising:  
determining whether the vehicle is traveling below a pre-determined velocity; and  
operating said plurality of sensing system aid modules in response to said determination.

[c20] A vision-based object detection system for a vehicle comprising:  
a transmission gear sensor generating a transmission gear signal;  
a plurality of vision sensing systems having at least one vision receiver, generating an object detection signal, and operating simultaneously in a plurality of modes selected from a reversing-aid mode, a parkingaid mode, a pre-collision sensing mode, an adaptive cruise control mode, a lane departure aid mode, and a lane-keeping aid mode; and  
a single vision processor comprising a plurality of sensing system aid modules corresponding with each of said

plurality of vision sensing systems, operating said plurality of sensing system aid modules in response to said transmission gear signal, and generating at least one warning signal or one countermeasure signal in response to said object detection signal.